saving of labour and of annoyance to passengers. Several companies both in France and in other countries now employ M. Ancelin's method of heating; the French Western Railway Company use it in their carriages from Paris to Havre, and also to Dieppe. In England, M. Ancelin states, the London and North Western Company had, last winter, 3000 of his acetate pans in use, and double that number during the present year.

He shows that his system may be applied to domestic purposes as well as on railways. It is certainly preferable to charcoal, which, in France, is a fertile cause of death by asphyxia. Fig. 1 shows a portable apparatus, which may be used in private carriages, and even as a foot-pan in bed, and several other purposes, its heat lasting five hours. The smaller figure shows a form of heater which may be used in a lady's muff or even in the pocket. The openings by which the acetate is introduced are hermetically closed, and the substance does not require renewal except at very long intervals. In filling the receptacle certain precautions must be used, which may be easily learned after a little practice. To renew the heat in the pans they have only to be kept in boiling water for half an hour.

NOTES

WE believe that two English observers are being sent out to record the approaching eclipse of the sun, and that the American Government have been asked, and have agreed, to find places for them with the American expedition. M. Janssen will be the head of the French expedition, which will be located on one of the smallest islands of the Caroline Archipelago.

ON the proposition of M. Fremy, the Academy of Sciences will defray, from its own funds, the expense of sending a naturalist with the Eclipse Expedition. The Austrian Government will send to the same station M. Palisa, the director of Pola Observatory.

FOR the two last weeks M. Dumas has been unable to attend to his duties of Perpetual Secretary of the Academy of Sciences. He has been suffering from bronchitis, but we are happy to state that no anxiety whatever is being felt by his friends.

A MATHEMATICAL Society has been founded at Edinburgh, the initiatory meeting having been held in the University on Friday last. Mr. John S. Mackay, M.A., F.R.S.E., Mathematical Master in the Edinburgh Academy, was chosen the first president, and Dr. Knott, secretary. Professors Tait and Chrystal were elected honorary members.

GENERAL PITT-RIVERS has offered his well-known and invaluable collection, now in the South Kensington Museum, to the University of Oxford, on condition that the University provides a suitable building for it. It is to be hoped, for the sake of the University and in the interests of science, that the authorities will accept the collection on the conditions imposed by the generous donor, though we should deeply regret its removal from London.

WE are not surprised that the London School Board should have hesitated last week to commit itself to the importation at once of technical education into elementary schools. The adoption of Dr. Gladstone's motion, that a committee be appointed to consider how best the Board could help in the matter, seems to us to be the judicious course to follow.

THE following premiums are offered by the Society of Arts for the 129th Session of the Society (1882-83):—Benjamin Shaw Prize.—1. A Society's gold medal, or 20*l*., for the best plan for "obviating or diminishing risk to life in the operations of coal mining." 2. A Society's gold medal, or 20*l*., for the best plan for "obviating or diminishing risk to life in the manufacture, storage, and transport of explosives." The Council of the Society leave it to the competitors to bring the plans under their notice in any way they may think proper, whether by model, written description, or otherwise. Howard Prize.—A prize of 100*l*. for the best essay on the Utilisation of Electricity for Motive Power. Preference is to be given to that essay which, besides setting forth the theory of the subject, contains records with detailed results of actual working or experiment. The Society reserves the right of publishing the prize essay. Fothergill Prize.—A Society's gold medal, or 20*l*., for the best invention having for its object the prevention or extinction of fires in theatres or other places of public amusement. Designs, plans, models, essays, descriptions, inventions, &c., intended to compete for any of the above prizes, must be sent in on or before October 31, 1883, to the Secretary of the Society of Arts, John Street, Adelphi, London.

THE Industrial Society of Berlin offers a number of prizes, amongst which we note the following:—1. For a method of precipitating zinc by galvanism from its dilute sulphate solution, 50*l*. 2. For the examination of German crude petroleum, with directions for preparing a good commercial product, 75*l*. 3. For a criticism of the usual indications of the value of iron and a proposal of more useful indications, 15*l*. 4. For a plan of the technical arrangements of a public institute for the examination of tissues, in order to oppose the frequent adulterations met with in textile industries, 15*l*. 5. For ameliorations in salt mines and salt works, 75*l*.

THE Birmingham papers report the Town Hall crowded with working men to hear a lecture from the Rev. W. Tuckwell, Rector of Stockton, near Rugby, on "The Midland Boulders and the Great Ice Age." The lecturer described the erratic blocks of the neighbourhood, and some recent discoveries of boulder clay at Birmingham and Stockton. He presented in a popular form the discoveries and theories of Croll, Geikie, Boyd Dawkins, Lubbock, Evans; and drew a picture of early man and his brute contemporaries as revealed by the bones and implements of the caves and river gravels. The lecture was illustrated by lime-light views of glaciers, extinct animals, and human implements; and was followed on the succeeding evening by a *conversazione* at the same place, when Mr. Tuckwell exhibited and explained to successive crowds throughout the evening a splendid collection of implements, ranging from the earliest palæolithic to the latest bronze ornaments and weapons, kindly lent without charge by Mr. Bryce Wright, of Regent Street. Both evenings were arranged by the Sunday Lecture Society, which provides popular scientific lectures every Sunday night throughout the winter half of the year in the four largest Board Schools in Birmingham, with special lectures in the Town Hall three times in the year. The lectures, as was the case with Mr. Tuckwell's, are frequently marked by a religious, though not by a sectarian tone; and the crowded audiences consist of persons rarely or never seen in church or chapel.

THE Berlin Academy of Sciences is about to send Dr. Lepsius, Professor of Geology at Darmstadt, with an assistant, to Athens, to make a geological survey of the neighbourhood, and endeavour to decide the question of the origin of the Athenian marbles.

UNDER the presidency of Count Hans Wilczek and the Baron Victor Erlanger, an International Electric Exhibition will be held in Vienna, opening on August 1, and closing on October 31. It will be an undertaking of a private nature, but is specially favoured by the Government.

THERE seems to be a serious decline in the once flourishing oyster fisheries of Denmark. Last year only about two million oysters were taken, which is far below the average, nor was the quality so good as usual. There were no new banks discovered during the year. The most important are now those in the Gulf of Vendsel and at Fladstrand.

THE Smithsonian Institution have received from Dr. Stejneger, who was despatched on a scientific mission to Behring Island some time since, *eleven* fairly perfect crania of the extinct Sirenian Mammal, *Rhytina stelleri*, together with sets of nearly all the other bones of the skeleton.

THE Royal Swedish Geographical Society has decided to appoint a committee, consisting of Professors Nordenskjöld and Gyldén, and Consul Elfwing, to consider the proposal for an international meridian and a common time. This committee has requested Consul Elfwing to draw up the Society's report on the question.

THE eminent Swedish palæontologist, Nathorst, has published the results of his examination of the fossil plants collected by the *Vega* expedition at Mogi, in South Japan. According to Hr. Nathorst these remains belong to the Tertiary period, and while they are older than the Glacial age, they would yet seem to be referable to a time when the climate was colder than at present. This instance of the presence in Eastern Asia of a flora of polar origin shortly before the advent of the Glacial period, is considered especially interesting from the strong evidence which it affords in favour of the theory of the migrations of plants in the early ages of the world's history.

FROM a communication of the results of Herr Håkonson-Hansen's observations of the November auroral displays which is printed in the last number of *Naturen*, we learn that while there were as many as nineteen specially vivid and one ordinary manifestation at Trondhjem in that month, the extraordinary length of time during which the auroræ retained their brightness gave a special character to the phenomena. On every night of the week from the 12th to the 18th inclusive, the heavens were illuminated with the auroral light, which on the 13th appeared as early as 4 p.m., while on the 17th it continued visible from 8 p.m. till 6 a.m. on the following morning. During this period it was found almost impossible to work the telegraphic wires by day or night. The most striking display occurred on the 18th, at 4.30 a.m. when a brilliant corona appeared in the zenith, from which vivid streams of light stretched to the horizon, while luminous waves flowed uninterruptedly from the latter towards the corona, diffusing so strong a light as to enable one with ease to read moderately clear print. On the same day, at Gothenburg, it was found impossible to make the wires act.

Naturen warns its readers not to put implicit faith in the statements made in reference to the large yields of silver, which may be expected from the old silver mines in Nordland. According to the prospectus of a company, which offers the public one thousand shares in the Svenningdal mine, near the little town Mosjö, 162,000 kroner's worth of ore was purchased from the owners in 1881 for the silver works at Freiberg in Saxony, yet, as the writer points out, there were only twenty-five men employed in the mine in the course of that year! It is well known that traces of silver are constantly found in the galena and cadmium yielded by these mines, but this fact even the most daring of speculators must admit to be a very insufficient basis, on which to maintain the numerous companies, amounting, it is said, to one hundred, which are offering the public at home and abroad shares in one, or other of the more or less exhausted mines of Nordland.

THE Anthropological Society of Paris has received from one of its members, Dr. Benzengre, a report of the autopsy of General Skobeleff, from which it would appear that the weight of the brain, according to Broca's system, was 1457, which is considerably above the mean for ordinary adult Europeans of his height (1·73m.) and even slightly above that hitherto given for men of exceptionally great intellect.

DR. WILLIAM H. STONE will give the first of three lectures, at the Royal Institution, on Singing, Speaking, and Stammering, on Saturday next (February 17); and Prof. Robert S. Ball will give the first of four lectures on the Supreme Discoveries in Astronomy, on Tuesday (February 20).

THE Norwegian Government have commissioned Dr. S. A. Buch during the present year to make researches, practical as well as scientific, into the great herring fisheries which annually take place on the west coast of Norway.

THE new mathematical journal, *Acta mathematica* (noticed in another column), published in Stockholm, Berlin, and Paris, has received a subsidy of kr. 1000 from the Swedish Government, while the Danish have granted a sum of 60*l.* a year to the editors in Denmark—Prof. Lorenz, and Drs. Petersen and Zeuthen.

THE U.S. Commissioners of Fish and Fisheries propose to build a large aquarium at Wood's Hole, Mass., in connection with their new station there. The aquarium will be devoted to biological researches of every description. At the adjoining station preparations are being made for the artificial propagation of cod, mackerel, halibut, and other fishes useful for food, and it is expected to hatch annually a thousand millions of cod and of other kinds in proportion.

AT the meeting of the Essex Field Club held on January 27, a resolution was passed condemning the proposed extension of the Great Eastern Railway from Chingford to High Beach. The Club regards it as "wholly unnecessary for the railway to take the route projected, and that it would not fail to prejudicially affect the advantages secured by the Epping Forest Act, which directs that the forest is to be preserved as far as possible in its natural aspect, and the Society hereby authorises the Council to petition Parliament against the project, and to send copies of this Resolution to the Press."

PROF. VERGA has been recently investigating the subject of intemperance in Milan (*Reale Ist. Lomb.*), a vice which seems to be on the increase there. Among other things he notes that suicide and kleptomania are very rare among the drunkards. With regard to the two sexes, he says that women fall much less easily into intemperance than men, and that drunken women belong to the lowest social strata, and show true brutification. Men appear to give themselves to excessive drinking more in the cold season; women in the mild season. Women relapse more frequently and shamefully into drunkenness than men, and more easily remain victims. The female drunkard excites disgust or laughter by her behaviour, but is not dangerous either to herself or to others; the male drunkard alarms by his excesses, and has often to be severely punished.

THE behaviour of the virus of anthrax in the form of spores and in that of the bacterium (*Bacillus anthracis*) under heat and various reagents, has been investigated fully by Signor Perroncito. The results are published in the *Atti della R. Accademia dei Lincei*, and show well how much greater power of resistance the spore has than the bacterium.

THE Jablochkoff light of the Avenue de l'Opera having been extinguished, the Place de Carrousel is the only street now electrically lighted in Paris at the expense of the Municipal Exchequer. But the electric light is every day finding new fields of display; a building company who are erecting a large structure in the Paris will manufacture the light on their own premises for their own use, and sell it to the tenants at moderate rates.

M. THOLLON has sent from Nice to the Academy of Sciences a determination of the velocity of the motion of the great 1882 comet, calculated from the displacement of the spectral rays.

THE action of very diluted nitromuriatic acid (aqua regia) on meat and other animal substances has been recently studied by Signor Pavesi (*Giorn. Farm. Chim.* xxxi. 529), and he finds the substance an excellent preserving agent; meat in pieces of about 1 kg. kept in the liquid in wooden vessels remains unaltered and savoury for years. The meat treated may also be dried at 15° to 20° without undergoing change, apart from a diminution of volume and the appearance of a brown colour. Put for a few hours in water, the meat recovers its original softness and natural colour. The proportions of the acids in the preserving liquid are not given. The method is also adapted to preservation of animal substances for scientific purposes.

TWO shocks of earthquake occurred at Agram, the first at 8.44 p.m. on the 4th and the other about 1 a.m. on the 5th. Both were of a violent character, accompanied, as the former disturbances were, by a rolling, thundering noise underground. The direction of the motion was from north-east and south-west, and each shock lasted about four seconds. No damage has been done hitherto. A telegram from New York, February 5, states that earthquakes have occurred at Bloomington, Illinois, and Wolfborough, New Hampshire, U.S., but no serious consequences are reported.

THE German Aëronautical Society held its general meeting at Berlin on January 13 last. During 1882 no less than 230 proposals, principally relating to the steerage of balloons, were submitted to the Society, none, however, furthering the question in any material way.

A MEMBER of the Paris "École pratique d'acclimatation" has discovered a species of spider on the African coast, the firm and long web of which resembles yellow silk very closely, and is said to be almost as good as the product of real silkworms. The syndicate of the Lyons silk-merchants has closely investigated the matter, and the result is reported as highly favourable. There seems to be no difficulty in the way of acclimatising the new silk-producer in France.

NEWS has been received in Bolivia regarding Dr. Crevaux's mission. It appears that several members of this expedition were not killed, as was formerly reported, but are kept prisoners by the Tabo Indians.

THE Museum of the Berlin Society for Commercial Geography will be opened on April 1 next. From time to time there will be in this museum special exhibitions arranged by foreign states. Several of these are already announced. The best part of the Brazilian exhibition will remain in the Museum.

LIEUT. WISSMANN, the intrepid and successful German traveller, arrived at Cairo on January 1. His route from Loanda, by way of Nyangwe, on the Lualaba River, to Zanzibar, which measures about 3600 kilometres, led him for at least one-third of the distance through unexplored country. He has thus solved some of the enigmas of equatorial Africa. It is the southern half of the Congo basin through which Wissmann passed, and he found this to be most densely populated. This fact is remarkable, as it was entirely unexpected. Wissmann also passed through the land of a tribe of dwarf negroes. On the long and dangerous route from Lake Tanganyika to Zanzibar the traveller met with a most hospitable reception at the hands of the renowned brigand chief Mirambo, who supported him in every respect.

IN our last number we stated that M. Tissandier's electromagnetic machine had given a power of 4 horses per hour; it should have been 4 horse-power.

THE additions to the Zoological Society's Gardens during the past week include a Greater Sulphur-crested Cockatoo (*Cacatua galerita*) from Australia, presented by Mrs. Norman; a Roseate Cockatoo (*Cacatua roseicapilla*) from Australia, presented by Mrs. Sims; a Peregrine Falcon (*Falco peregrinus*) from North America, presented by Mr. C. H. Webster; a Vulpine Phalanger (*Phalangista vulpina*) from Australia, presented by Mr. G. S. Northcote; four Ceylonese Terrapins (*Clemmys trijuga*) from Ceylon, four —— River Turtles (*Emyda* ——) from India, a Globose Curassow (*Crax globicera* ♀) from South America, deposited; a Blue-cheeked Amazon (*Chrysotis cœligena*) from Guiana, two Maximilian's Parrots (*Pionus maximiliani*) from Brazil, purchased; a Collared Fruit Bat (*Cynonycteris collaris*), two Four-horned Antelopes *Tetraceros quadricornis*), born in the Gardens.

OUR ASTRONOMICAL COLUMN

DENNING'S COMET.—Mr. W. E. Plummer, of the University Observatory, Oxford, has made an interesting contribution to a branch of astronomical investigation, in which we have not shone greatly in this country, in the shape of a definitive determination of the elements of the orbit of the comet discovered by Mr. W. F. Denning, of Bristol, on the morning of October 4, 1881, which proved to be one of short period, though not previously observed. Accurate positions were obtained between October 5 and November 19 at Athens, Dun Echt, Harvard College, U.S., Marseilles, Odessa, Oxford, Palermo, Paris, Rome, and Strasburg. Starting with the second ellipse calculated by Dr. Hartwig, which assigned a revolution of 8·884 years, Mr. Plummer compares all the observations with an ephemeris computed therefrom. He then determines, by the method of variation of constants, for four-day intervals, the effect of perturbations by each of the planets from Mercury to Saturn inclusive, during the period of visibility; the influence of the perturbations upon the observed right ascensions and declinations being inferred by calculating the differential coefficients for variation of elements for the particular epochs, and these coefficients were used in the formation of equations of condition. The tabular longitudes of the sun were corrected by the results of observations at the Royal Observatory, Greenwich, supplied by the Astronomer-Royal. Normal equations were then formed and solved in the usual manner by least squares, and a corrected set of elements was thus found. The positions of the comet computed from them, and the positions inferred from the substitution of the corrections to the elements in the original equations of condition, agreed generally, but owing to their considerable amount, and the neglect of terms of the second order in calculating the differential coefficients, the agreement was not exact. Since Mr. Plummer's principal object was the determination of the comet's mean motion, he preferred to obtain the values of the several unknown quantities in terms of the mean motion, so that by successive small variations of this element, accompanied by the corresponding alterations in the others, several sets of elements could be formed, and the preferable orbit selected by direct comparison with the observations. This additional labour adds much to the value of Mr. Plummer's work. He accepts as the most trustworthy guide the sums of the squares of the errors in right ascension and declination, though the two do not correspond to precisely the same value of the mean motion, and so obtains the following definitive orbit:—

Epoch 1881, September 28·5 Greenwich M.T.

	°	′	″	
Mean anomaly	1	40	35·39	
Longitude of perihelion ...	18	36	12·8	Mean Eq. 1881·0
,, ,, ascending node	65	52	2·0	
Inclination	6	50	22·6	
Angle of eccentricity	56	8	28·4	
Log. semi-axis major	0·6315148			
Period of revolution	3235 days.			

Hence we find (the unit of distance being the earth's mean distance from the sun)—

Semi-axis major ...	4·28070	Eccentricity	0·8304135
,, minor ...	2·38498	Period in years ...	8 8567
Aphelion distance..	7·83545	The perihelion passage Sept. 13·43493 M.T. at Greenwich.	
Perihelion distance	0·72595		

The orbit of this comet is remarkable for the near approach it makes to the orbits of Venus, the Earth, and Jupiter. By Mr.